SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 969---Vol. XXIV.] LONDON, SATURDAY, MARCH 18, 1854. [GRATIS.

ON THE PROBABLE EXTENSION OF THE CENTRAL BRITISH COAL FIELDS.

[Since the publication of Mr. Joseph Holdsworth's elaborate and interesting letter, "On the Extension and Accessibility of the Great Coal Formation beneath the Secondary Strata of England," in the Journal of February 18, we have been favoured with a copy of that gentleman's address, which, though delivered several years ago, bears so pointedly on the important question now under discussion, that we have much pleasure in presenting it to our readers.]

An Address, on the Probable Extension of the Central British Coal Fields, delivered at Leicester.

BY JOSEPH HOLDSWORTH, ESQ., OF BILLESDON COPLOW HOUSE.

In appearing before you for the purpose of endeavouring to comply with your request, in giving the best information I may be capable of imparting affecting the important object you have in contemplation—viz., that of attempting to discover the great coal formation in the immediate vicinity of this populous and flourishing town—I assure you that, in so doing, I feel no small degree of diffidence, arising from a conviction of my inability to respond to your flattering appeal in the manner required by the magnitude and importance of the subject matter to be descanted upon. However, relying on your indulgence, and impelled by those inherent feelings and peculiar tastes which appear to "have grown with my growth, and strengthened with my strength," and which you, I believe, are all here well aware have heretofore been manifested in similar dissertations, in the display of humble but, I trust, honest, reasonable, and hesitate not to add, almost enthusiastic energies. I will, without further apology, proceed to attempt forthwith to elucidate the probabilities of success which, in my opinion, warrant the prosecution of your undertaking by the most spirited exertions, and impart to it a character of the most stirring importance. It would be somewhat irrelevant to my present purpose, were I to launch out into a wide field of geological disquisitions; nevertheless, as I am desirous of giving you a comprehensive view of the interesting subject under discussion, and particularly anxious that you should clearly understand the true geological position of the spot where you purpose putting down your shaft for the discovery of coal, as also that you should become as thoroughly acquainted with the *ratio justifica*, or reasons which justify, as it is possible for the plainest language, and a reference to the most palpable existing evidence, to represent, I consider it necessary, in order to accomplish these views, and the better to illustrate my opinions, and to substantiate any observations I may deem essential to the subject to make, to enter rather particularly into some general and local geological details. I would first premise that it has been well observed by one of the first cosmogonists of the present day, that geology has risen to the rank of an *exact science*, or, I may say, in other words, it has been well ascertained by the multifarious researches of acute scientific investigators, that in the general arrangement of the materials composing the earth's crust, the most exact and beautiful order exists, that the same creative power and wise economy is as palpably demonstrated in the formation of this stupendous structure, as is displayed in the delicate leaflet, the blade of grass, or the exquisite flowret, which help to adorn its wide-spread and diversified surface. It has also been well established by the labours of the practical geologist, as an important fact, on which we may confidently rely, that the order of succession of the various classes of strata which constitute the crust of the terraqueous globe is never inverted; and, consequently, additional to the fact that these great classes or formations respectively contain fossils and mineralogical characters peculiar to themselves (and by which, of course, they are readily distinguishable from each other), he is enabled, by the direction of these infallible guides, to recognise and ascertain, not only the particular formation he may happen to be traversing, but also to prognosticate with amazing precision what formations would be likely to develope themselves in the progress of a shaft therefrom sunk, some hundreds of yards deep into the earth. In fact, the absolute infallibility of this species of foreknowledge would be unquestionable, were it not for the well-known circumstance, that in some particular localities one or even more members of the general series are found to be absent from their assigned geological position, though this circumstance, comparatively speaking, but rarely occurs: nor should we, without the interposition of some external evidence, be justified in too freely anticipating such an event, on account of that co-extensive distribution for which some of the secondary and the other great formations are remarkable.

Having now, gentlemen, referred to the creditable, I may say indubitable, nature of the basis on which we are justified in building our inferences and opinions, I propose to proceed to those enquiries which more immediately affect your projected undertaking. In order to this end, I could wish, first, to erase from your minds all narrow-minded conceptions and prejudices, as regards particularly the vast extent and magnitude of those invaluable mineral stores you hope ere long to aid in exploring; but before attempting this, I would guard you against imagining, from the instances I am about to adduce, that I wish to infer that coal is almost everywhere to be found; on the contrary, I may here observe that, geologically speaking, coal is not suspected to exist at all throughout vast preponderating areas of the old and the new world, and even in many places where it actually does exist it is so concealed by vast structures of superimposed formations that it is perfectly inaccessible. This understood, I proceed to show that, as respects the object you have in view, you have nothing to anticipate fearfully from the former nor the latter assertion. As regards the geographical extent of coal fields, perhaps I may be permitted to introduce the subject by remarking that they, including the mountain limestone, which together principally constitute the great carboniferous group, are said to occupy immense and numerous areas, partially encircling the globe in the character of a vast zone, extending from about 42° to 60°, or, perhaps, if Melville Island is included, to 75° north latitude. Now, within the confines of this mighty zone, the extensive coal fields of Great Britain and Ireland are situated, and they, taken in the aggregate, may be properly said to form (though the most formidable one as respects coal) but a link in this stupendous concatenation of the carboniferous series. In referring to the component parts of this portion, you will observe by this geological map that we must name the coal fields of Ireland, Scotland, Northumberland, Cumberland, Lancashire, Yorkshire, Derbyshire, Staffordshire, Warwickshire, Leicestershire, Shropshire, Cheshire, Flintshire, Gloucestershire, Somersetshire, and South Wales, all of which, as already proved, are immense depositories of coal. In the extensive tract of Northumberland and Durham coal measures, forty beds of coal have been seen, which are supposed by many observant persons of extensive practical and scientific knowledge to continue their course towards the south, beneath the magnesian limestone and red marl formations, through a great extent of country, till they are seen to reemerge again in the neighbourhood of Leeds; and from thence they extend in one continuous uncovered tract a distance of 60 miles to Nottingham, where they again disappear beneath the red marl formation only. And you, probably, all here are aware that coal measures are again to be seen at Ashby-de-la-Zouch, Tamworth, Nuneaton, &c., raising their respective denuded or exposed irregular tracts in the midst of the great central red marl plain, like, as it were, so many islands in the midst of the ocean; and until lately it was generally supposed (indeed, by many practical men is so now) that these isolated coal tracts were in reality cut off below, as apparently above, by the red marl formation, through which to venture operations in the search for coal was considered as commensurate to embarking upon a dread ocean of the most ruinous uncertainty.

But the spirit of enterprise, guided by the aspiring and unfolding hand of science, has dispelled these fears. You know, gentlemen, that in our own locality an adventurous hand with a heavy purse persevered for a period of three years, until the dread confines were passed, and mineral riches flowed up abundantly through them, diffusing joy and gladness to all around, awakening the spirit of industry, and calling into being, as with a magic wand, the buildings, railways, and busy scenes which now animate that part of the county. In all probability you are aware that I allude to Lord Maynard's successful trial at Bagworth, a trial that appeared to the majority of people a wildly improvident and speculative one, because, forsooth, it was not made within a cable's length of the carbonaceous shore, but, on the contrary, was boldly experimentalised at a distance of eight or ten miles therefrom, into the generally supposed unfathomable depths of this red sea; or, in plainer terms, about the space just specified from the north-western verge of the red marl, where the adjacent Ashby coal field merges beneath it; and therefore it was sneered at by many, and, to my certain knowledge, utterly condemned by a certain mineral surveyor residing in an adjoining county, who, from long practical experience, arrogates to himself an infallible knowledge of the prophetic art, but who, alas! the moment he quits the islands I have particularised, for the purpose of discovering the *black diamonds* of other lands (I could produce half a dozen instances to prove) becomes totally bewildered, and betrays at once his utter ignorance in those scientific acquirements which ought to justify his opinions, and qualify his profession. However, although this man, despite of his unpardonable ignorance, has, by his *dark* subterranean gropings, filled his coffers with riches, I will not at this time, for his own credit sake, and for the credit of the profession to which he belongs, be so illiberal as to bring his name to *light*.

On the faith of the same general scientific principles which prompted the Bagworth enquiry, you, gentlemen, may with confidence embark in yours—indeed, I may justly add, with more flattering prospects of success, the extension of the coal beds beneath the red marl formation in this direction being fully proved. I believe the site of your intended trial pit is situated about the same distance, and in the same point of the compass, from Bagworth, as is applicable to Bagworth with regard to the situation of the Ashby coal field; and for my part, I confess I can see no just or plausible reason for supposing that your endeavours, if carried on with proper spirit and perseverance, should not prove equally successful.

The town of Leicester is situated on the new red sandstone in question, which European formation, so called, lies in a geological position immediately above the coal measures, as actual penetrations have demonstrated, not only in the vicinity I have just referred to, but in various other parts of the kingdom; and as I have before elucidated, we find the coal measures occupying their ascribed position, sometimes appearing as isolated, uncovered tracts, and anon diving beneath the red marl, in their progress from the south of Northumberland to within about ten miles of the ground on which we are now treading! At that spot, where last explored, we also find that there are no signs of diminution exhibited in the quantity of the mineral treasures which have traversed (perhaps partially) such an amazing extent of country; nor do we find (as is often confidently asserted) that these mineral treasures have merged any further down than those of the most northern fields, out of the reach of the miner.

These facts speak volumes in favour of your contemplated undertaking; they establish evidence which no honest man of scientific and extensive practical knowledge would dare to gainsay, or presume to controvert.

By this time, gentlemen, I trust you are sufficiently aware of the actual geological position of your intended place of trial, with regard to the great independent coal formation; and that being the particular fact I was most desirous of presenting clearly to your comprehension, it is scarcely necessary for me to direct your attention to the circumstance of the regular succession of the superimposed formations, which commence with the lias about three miles to the south-east of Leicester, and continue, all slightly inclining in that direction, till they reach and dive under the chalk formation, which is in turn crowned by the tertiary strata, thus of course increasing the difficulty of reaching the proper geological position of the old coal formation, in proportion as we continue to cross them at right angles in our progress from hence to the south.

While contemplating these highly flattering testimonials of your ultimate success, I would not have you wholly unmindful that mining operations, even in well-explored districts, are always subject to certain casualities; the innumerable faults, dykes, &c., which intersect the coal and other strata, sometimes so disarrange the coal beds as to make them difficult of access. However, though these dislocations sometimes prove a partial evil, the well-known fact that they cause repeated elevations of large areas of coal through immense tracts of country, attests that they are in reality of great practical utility. It would be foreign to my present object to enter here into the doctrine of these stupendous complicated effects, generally speaking, of igneous and gaseous causes.

I believe I have now, as physically affecting your enterprise, chiefly to observe that I am of opinion you have nothing to fear as to the thickness of the red marl, which formation, as well as the other of the secondary class, varies exceedingly in its vertical dimensions. The mean geological thickness of the red marl and lias is between 400 and 500 ft. each, though all the penetrations through the former to the coal measures with which I am acquainted, and which have been in the respective counties of Warwick, Nottingham, Leicester, and Gloucester, have proved it in the particular spots there tried existing very considerably below the geognostic estimate; indeed, its thickness at Bagworth pits, where it is found to reach 312 ft., far exceeds its actual thickness in any one of the places I have just alluded to; and it is also worthy of observation that the borings at this time in progress at Southam, in Warwickshire, have attested the great lias deposit, in which they were commenced, to be there but about 350 ft. in thickness.

I may here congratulate you on the course you have wisely determined on pursuing, in sinking a shaft, in lieu of being subjected to all the horrors of a *bore!* I am very glad to perceive that my bitter experience has at length been productive of such precautionary measures and spirited resolves. In naming the known progression of coal fields from Northumberland into this county, I believe I omitted to state that the actual distance, in a straight line, between the north and south carboniferous extremities referred to is upwards of 200 miles, in about 145 of which the coal measures appear at the surface, leaving about 70 miles of them concealed (wherever in that space they exist) by the magnesian limestone and new red sandstone formations, as far as Nottingham, and apparently by the latter only, as they may continue advancing to the south of that place. It is scarcely necessary to observe, that the intervening untried space, of about ten miles, between this town and Bagworth dwindles down to a mere point when contrasted with the vast extent of coal country I have just specified, exhibiting in a very forcible manner the great absurdity of supposing that the coal formation does not extend incalculably to the south or south-east of the as yet most southerly mining operations of this county.

But whilst I am directing your hopes and attention to these inviting circumstances, and pointing to the near approximation of the new Leicestershire coal field, properly so called, I must not omit by any means to remind you, that you have much better authority than mine for supposing that the coal fields to the north of us extend very far beyond this locality—viz., that justly and long-celebrated geological writer, the Rev. W. D. Conybere, who has published his opinion that the Nottingham coal field, which merges to the south-east beneath the new red sandstone near that town, continues to trend (below the same) along the valley of the Soar, by way of Leicester, in its course to the north-eastern borders of Warwickshire.

It having frequently been very absurdly argued that coal, if found, could not be worked from the central and south-eastern districts of this county, on account of the general height of the table-land composing its surface, as indicated by the tributary streams and rivers which take their rise therein, and flow to the sea in almost every direction, the argument being mainly based upon the fallacious idea that coal always occupies very low relative situations—*i. e.*, with regard to the level of the sea—I will, therefore, here adduce a few comparative heights of the coal measures, &c., leaving you to draw your own inferences therefrom. As a standard of comparison familiar to you all, I may first state that Bardon Hill, the highest in this county, and composed of greywacke, is 853 feet above the level of the sea. Leicester is only 200 feet above its level, standing on the red marl formation, which you will recollect is, geologically, based on coal measures. The coal measures on Ashby Wolds are about 215 feet above the level of the sea; while at Simonside Hill, in Northumberland, the coal measures attain the height of 1407 feet above the sea level. At Holme Moss, Derbyshire, they also reach the height of 1859 feet. But lest these examples of the height which coal sometimes attains above the sea level should not suffice, I will adduce one more, which I think will—viz., near the mines of Pasco, in Peru, South America, coal is found at the height of nearly three miles above the sea! One more example, and that of depth, and I have done—viz., at Monkwearmouth, near Sunderland, there is a coal pit 506 yards deep!

Thus much of the height, and depth, and breadth, of coal and its concomitants; all of which deductions, you cannot fail to observe, argue most decisively in favour, not only of the presence of the coal formation immediately beneath the red marl series, where you propose putting down your shaft, but also the accessibility of workable seams of coal in that situation.

And now, gentlemen, having I trust fully, and I hope satisfactorily, explained the justifiable and inviting nature of your intended undertaking in a geological point of view, I must, before concluding, entreat your attention to an example or two I propose here to introduce, as illustrative of the very great importance of the discovery of new coal mines, not only in a local, but in a national point of view. In a work, published a year or two ago by a Spaniard, there is a comparison between the produce of the gold and silver mines in America, and the coal mines in England, from which it appears that the gross value of the annual produce of the coal mines, which is 18,000,000 tons, amounts to 450,000,000 francs, including the wages and other charges; whilst the produce of the gold and silver mines, including the same charges, is only 220,500,000 francs: showing a balance in favour of the coal of England, over the gold and silver mines of the New World, of no less a sum than 229,500,000 francs!

Our present annual produce of coal (which at the pit's mouth is estimated at about 8,000,000*l.*) is between three and four times that of all the rest of Europe, and thirteen times that of France.

The following singular circumstance (which may be familiar to some of you) happened a few years ago in Parr, about 13 miles from Liverpool, where there are several extensive collieries. It will tend to show the immense value of coal mines which lie under a small superficial extent of land. An elderly widow lady sold some property in Parr, consisting of a house and about 30 acres of land, to a gentleman, for 3000*l.* The old lady thought there must be coals under the land, as there was so much in the neighbourhood; but it was the decided opinion of coal proprietors, and others conversant with coal mines, that there were not any coals on the property. The seller of the property, however, insisted that the coals should be reserved, unless the purchaser would give her 100*l.* for them. This he refused doing, and the coals were accordingly excepted from his purchase, and reserved to her. The old lady died soon after, bequeathing the coal mines among the children of a deceased sister, seven in number, who were all labourers, and the residue of her property, worth about 3000*l.*, to the children of another sister. The bequest of the coal mines was considered a nominal thing, and the dissensions in the two families were great on account of it. The coal legatees brooded for a length of time over their disappointment in not sharing their aunt's property with their cousins, but at length they contrived to induce some persons, who were supposed to have more money than wit, to undertake the expense of boring on the land to ascertain whether there were coals or not. The boring continued for a considerable time, to the great amusement of persons connected with collieries; but at last, to their great astonishment, chagrin of the purchaser, and the unbounded delight of the legatees, two delfs of the best coal in Lancashire were discovered, extending nearly the whole breadth of the land, and could be easily worked. These coals were immediately purchased by the proprietors of a neighbouring colliery for 20,000*l.* On subsequent borings three lower delfs were found, which the same parties purchased for 15,000*l.*

Striking as are the remarkable facts I have just related, it were scarcely necessary that I should have adduced them for the purpose of showing what must be obvious to the mind of even every cursory observer. Contemplate but for a moment the rise and progress of our stupendous manufactories and commercial transactions, and the facilities which they receive from the giant powers of steam, and you will assent at once with me, that they have emanated from the products of the miner's labour, and continue to be impelled forward in their rapidly increasing and prosperous career solely by the application of the mineral treasures which his enterprise, skill, and industry, are unceasingly supplying from those ample subterranean storehouses where an all-wise and benevolent Providence has treasured up, in the character of enduring coal, for the benefit and happiness of these latter ages, the luxuriant vegetation which once adorned the primeval world.

And yet, strange to tell, when an appeal is made by experienced and enterprising individuals to a British public, requesting aid in unsealing one of these invaluable and mighty repositories of heat, and light, and wealth—and although that proposal be recommended by the lucid and fundamental truths of an orthodox science—yet despite, I repeat, of those obvious advantages and proper accompaniments, we too commonly behold our monied man (one of the "discerning public") sneering at what he is pleased to term the "wild idea," and that, too, with the same grave air of self-wisdom, and dogmatical contempt, which one may very well imagine would be manifested by one of our professors of geology, were any person to presume to solicit his pecuniary assistance in an attempt being made to reach coal from any of the formations invariably found below it—as, for instance, the mill-stone grit, carboniferous limestone, old red sandstone, or the syenite and grauwacke slate of Charnwood Forest.

On the other hand, remove but the existing doubt—for however slight that doubt may happen to be, remove it you must; then exhibit to him the bright face of a six or ten-feet coal: instanter his eyes glisten with eager desire; for his sagacity now perceives 50, or perhaps 100, per cent. reflected from its glossy surface. His *public* spirit is aroused!—his hitherto slumbering energies suddenly assume all the courage and colouring of noble and adventurous enterprise—aid now he must, and will, in directing these new-found treasures into the channels of commerce; and perhaps it may so happen that he is admitted to employ his thousands, to the almost utter exclusion of the truly public-spirited mechanic, who, to the utmost extent of his resources, cheerfully contributes towards the removal of the original doubt.

I flatter myself you will all allow that this is a fair specimen of the kind of assistance which the most justifiable enterprises commonly receive from many of our properly so-called safe gentry of the present day; and I cannot refrain from remarking, that I think it also a very fair sample of *modern patriotism!* It is said that every man who plants an oak is, strictly speaking, a patriot; but I say, that every man who contributes his quota of assistance, whatever that may be, towards opening those immense magazines of coal, which most assuredly do exist, at an accessible depth beneath vast areas of the new red sandstone, lias, and probably some other of the secondary formations of this kingdom, is a *patriot indeed:* for he thereby tends to render abortive those despicable schemes and practices with which the interested, the mean, and the sordid, are continually endeavouring to thwart the pregnant spirit of just and becoming enterprise; and he also contributes towards the realisation of blessings, which diffuse the rays of cheerfulness and comfort around his own hearth, and throw a lustre and a splendour over the name of Britain, which she will only cease to merit when her coal mines are exhausted.

AMERICAN MANUFACTURES.

The number of cotton mills and establishments producing cotton goods of a value exceeding $500 per annum is 1091; the capital invested is $74,501,000; the value of raw material consumed annually is $34,835,000; the number of hands employed, male and female, is 83,300; the entire value of goods producing within the year was $61,869,000.

The number of establishments for the manufacture of woollen goods is 1539; capital invested, $28,118,000; pounds of wool consumed, 70,862,829; value of all raw material, $25,756,000; number of hands employed, male, 22,678; female, 16,574; yards of cloth manufactured, 2,206,652; value of entire products, $43,207,555.

The number of furnaces and other establishments for making pig-iron in operation is 377; capital invested, $17,346,425; tons of ore used, 1,579,309; tons of mineral coal used, 645,242; bushels of coke and charcoal, 54,165,230; number of hands employed, males, 20,208; female (slaves), 150; tons of pig-iron, 564,755; value of entire products, $12,748,777.

There are in the Union 1391 establishments for producing castings, employing a capital of $17,416,361, and using 345,553 tons of pig-iron, 11,416 tons of old metal, 9850 tons of ore, 190,891 tons of mineral coal, and 2,413,750 bushels of coke and charcoal. The number of hands employed is, males, 23,541; females, 48; tons of castings produced, 322,745; value of entire products, $25,108,155.

The number of wrought-iron establishments is 422; capital invested, $14,493,39[illegible] tons of pig-iron used, 251,491; tons of blooms used, 33,344; tons of ore used, 78,7[illegible] tons of mineral coal consumed, 538,063; bushels of coke and charcoal, 14,510,58[illegible] number of hands employed, males, 13,178; females, 79; tons of wrought-iron made, 278,044; entire value of products, $16,747,074.

In the manufacture of malt and spirituous liquours there is invested a capital of $8,334,254; bushels of barley consumed, 3,787,195; India corn, 11,067,761; rye, 2,161,97[illegible] oats, 66,517; apples, 526,840; hogsheads of molasses, 61,675; tons of hops, 18[illegible] The number of hands employed is 5487; barrels of ale produced, 1,177,924; gallons of whiskey and high wines, 42,143,955; gallons of rum, 6,500,500.

New Boiler.—Messrs. Smith and Phillips, gas engineers, have patented an improved boiler, which consists of a number of concentric hollow cylinders, in which a very thin body of water is constantly exposed to the action of the heat. In the interior of the boiler, a vacuum or air-chamber is formed, which consists of a cylinder of copper, or other metal, closed at both top and bottom, and made air and water tight, and is so placed that no water can enter it.

Arsenical Food.—In some parts of Lower Austria and Styria, and especially in the hilly regions towards Hungary (says *Blackwood's Magazine*), there prevails among the peasantry an extraordinary custom of eating arsenic. It is eaten professedly for one or both of two purposes—1. That the eater may thereby acquire freshness of complexion and plumpness of figure.—2. That the wind may be improved, so that long and steep heights may be climbed without difficulty or breathing. By the middle aged and the old it is esteemed for this influence; and both results are described as following almost invariably from the use of arsenic. To improve their appearance, young peasants of both sexes have resource to it, and it is very remarkable to see how wonderfully well they attain their object; for these young poison eaters are generally remarkable for blooming complexions, and a full-rounded, healthy appearance. No symptoms of illness, or of chronic poisoning, are observable when the dose is carefully adapted to the constitution and habit of body of the person using it; but if from any cause the arsenic be left off for a time symptoms of disease occur, which resemble those of arsenical poisoning. From these symptoms there is only one speedy mode of relief—a return to arsenic eating.

Madame Tussaud's Exhibition.—Among the numerous works of art which abound in the Napoleon Chamber now, perhaps, surpass in beauty and execution the Table of the Marshals. This splendid specimen of painting on porcelain was produced at the celebrated manufactory at Sevres, and was presented by the Emperor Napoleon to the City of Paris, after the Battle of Austerlitz. The whole of the portraits were executed on porcelain by the celebrated miniature painter, Isabey.

ON THE GEOLOGY OF THE VICINITY OF MOUNT ALEXANDER, VICTORIA, AUSTRALIA.

BY A. SELWYN, ESQ.*

[Communicated by Prof. Ramsay, F.G.S.]

This communication was illustrated by a carefully executed geological map and section. Mount Alexander forms part of a granite range, which extends from the River Coliban on the east to the Loddon on the west, with a breadth varying from 4 to 12 miles, and describing an irregular semicircle, the convexity being to the north. The granite is bounded on all sides by metamorphic rocks, and at its eastern extremity it is overlaid by patches of basaltic lava, amongst which the Coliban runs. The basalt occurs also to the east of the Coliban in still greater extent, overlying the metamorphic rocks along the course of the Campaspe. At the western limit of the granite, also, similar basalt forms the lava plains of the Loddon.

The granite is coarse-grained, and easily decomposes; it has a spheroidal structure, and is traversed by north and south, and east and west, joints, and it is penetrated by numerous fine-grained granitic elvans. The granite appears to be barren of metals, and has no quartz veins.

The metamorphic rocks consist of sandstones, clay-slates, and conglomerates, striking everywhere true north and south, and dipping east and west, at angles varying from 45° to 90°. The strata become more crystalline and micaceous in the immediate vicinity of the granite. The whole mass of the sandstones, slates, &c., is traversed by an intense north and south *cleavage*, as well as by a system of large joints, both north and south (generally at right angles, or in an opposite direction to the cleavage planes), and east and west. The *stratification* is obscure, but generally coincides in strike with the cleavage, but dips at a somewhat lower angle. Coincident with the cleavage, both in strike and dip, are numerous quartz veins throughout the strata. These veins contain gold, galena, blende, and ores of iron; platina, also, is said to occur in them. The metamorphic rocks have not as yet afforded any fossils; but Mr. Selwyn considers it probable, from their lithological characters, that they may be the equivalents of the Cambrian or Lower Silurian strata. Their total thickness in this district is about 35,000 feet.

The basalt resting on the granite and the slate-rocks is vesicular, and is evidently the remains of vast lava streams that have flowed down and filled up the then existing valleys of the country; the present river-courses have been subsequently excavated through the hardened lava along the same valleys. Some of these excavations expose the lava and the subjacent rock in vertical cliffs, from 200 to 300 feet high. The auriferous drift overlies all the surface formed by the metamorphic rocks. It is of very late tertiary date; it varies in thickness from a few inches to 100 feet and upwards, and consists of stratified and unstratified masses of ferruginous clays, sands, and gravels, interspersed with angular and partially rounded fragments of clay-slate, sandstone, quartz, &c. The gold is usually found in the lowest portion of the drift, and has been derived from the quartz-veins everywhere traversing the metamorphic strata. The drift occurs almost universally distributed in the gullies, on the flats, and over the hills, occupied by the metamorphic rocks; and is, in fact, formed from the decomposition, breaking up, and spreading out of the immediately subjacent rock; the fragments are seldom much water-worn.

ON GEMS AND GOLD-CRYSTALS FROM VICTORIA, AUSTRALIA.

BY G. M. STEPHEN, ESQ., F.G.S.*

In this communication **Mr. Stephen** gave a detailed catalogue of precious stones and specimens of crystallised gold, obtained by himself in the colony of Victoria, and now laid before the society. In this catalogue, the localities from which the specimens were obtained are given, and the characters of each specimen are described. These gems and crystals were collected by the author in the course of several years' residence in Australia; and the history of each specimen was rigorously investigated. Most of them were sent to Mr. Stephen for examination, or brought direct from the various "diggings," amidst parcels of quartz-crystals (mistaken for diamonds) and other shining minerals, having been found in the "tin-dishes" of the gold-diggers whilst washing the soil in quest of gold. The specimens are water-worn, and were generally associated with the following minerals:—quartz, felspar, garnets, tourmaline, augite, olivine, titaniferous iron, oxide of iron, iron pyrites, and, in the case of the specimens from the River Ovens, with oxide of tin, both in crystals, small lumps, and sand. The gems are:—Blue and white sapphire, from Ballarat; sapphire, spinel ruby, ruby, and small chrysolites, from Peel River; zircons, spinel ruby, topaz, garnet, and tourmaline, from Ovens River. Mr. Stephen quotes also the following as recorded or stated localities:—garnets, Peel River; garnets and pyropes, Mount Alexander; diamond, New South Wales; white topazes, New South Wales and Cape Barren Island, Bass's Straits; large beryls, Mount Crawford, South Australia; large tourmalines, Encounter Bay, South Australia, and D'Entrecasteaux's Channel, Van Diemen's Land; emerald, Mount Remarkable, South Australia; and opals, South Australia. The author observed, that the conditions under which all these gems were found are similar in Australia and in the countries now supplying them; and hence he infers that the gems of Australia will soon be sought for as articles of commerce.

Mr. Stephen stated, that gold in Victoria was found under the most interesting forms of crystallisation, and he exhibited some extraordinary crystals of this metal, both in groups and single, found at the River M'Ivor and at Ballarat. In one group there is a crystal (a cube, with ascending planes, as if passing into the octahedron), which has reached the enormous size of seven-eighths of an inch in diameter. There is also a large crystal, which Mr. Brooke, the crystallographer, considers to be a dodecahedron, extravagantly distorted; this is five-eighths of an inch in diameter. Of the several other crystals, some are highly perfect dodecahedrons and octahedrons, with plain and cavernous sides, cubes in different stages of formation, and interlacing (when in groups) hexagonal crystals of transparent quartz.

Attention was also drawn to an interesting macle-crystal of gold, having the pentagon face, with a mammal of gold resting upon it; and to some delicate dendritic gold, which, from its similarity to moss-copper, the author designates "moss-gold." The author stated, that the gold of Australia was often found enclosed in, and enclosing, quartz and ironstone, but never, that he had heard of, in granite. The highest standard gold has been found at Ballarat, the M'Ivor River, and the Ovens River; whilst the gold of Louisa Creek, and other localities in New South Wales, was apparently the most alloyed with silver. A sample of gold, coated with a black substance, which resists the acids, and is not acted upon by the magnet, was also exhibited. Other interesting specimens were—a conglomerate of chlorite, quartz, ironstone, and steatite, inclosing gold, and taken in the author's presence from the bottom of a "gold lode," between nearly perpendicular walls of quartz, at a depth of 90 feet, near Mount Alexander; also gold resting upon galena in quartz.

* Read before the Geological Society, Somerset House, London.

ON THE GOLD REGIONS OF CALIFORNIA.

BY MR. WILSON.*

[Communicated by Sir R. I. Murchison, F.G.S.]

The author, a practical miner, who has explored during three years some of the richest auriferous tracts of California, laid before the society a map and sections of these gold regions. The Sierra Nevada is of granite, and rises to the height of about 5000 feet above the sea; it is flanked on the west by parallel bands of schistose crystalline rocks (gneiss, limestone, and micaceous, chloritic, and argillaceous slates), striking north-west and south-east; nearly vertical close to the granite, and dipping somewhat to the east in the outer parallels. A fossil shell, like an orthis, was found in the chloritic slate. These rocks form a tract about 50 miles in breadth, and averaging about 4000 feet in elevation above the sea. It is traversed by three great veins of auriferous quartz, parallel to the schists and to each other. Between this district and the coast are wide plains of tertiary deposits, extending on either side of the coast-range, which runs in a direction parallel to the coast and the Sierra. The coast-range is about 2500 feet high, and is formed of clay-slate, with a westerly dip. The clays, gravels, and boulder-beds, in the ravines and plains of the high ground, which is traversed by the above-mentioned quartz veins, contain gold more or less abundantly, and appear to have been formed under various conditions, by superficial decomposition of the rocks, by landslips, and by detrition and transport through aqueous agency. Calcareous deposits, also, of late tertiary date, covering the gold-drift, embedding boulders and sand, and in the upper part commingled with volcanic cinders, occur extensively in some of the valleys, and on the sides of the hills of this elevated region.

The largest of the three quartz veins has itself been worked for gold, at Carson's Hill, at the Mariposa River, and the Agua Fria; and another of the veins at Sonora. The gold was found in the upper part of the veins—a circumstance which the author found to obtain in the quartz veins generally. Quartz mining, however, on account of the uppermost and richest portions of the veins having already been decomposed and worn away, is not found to be so productive as the generality of the "diggings." Mr. Wilson describes several of the gold diggings of the district; especially near Sonora; on the Rivers Stanislaus and Tolumnee; and at Mormon's, Curtis's, and Murphy's Creeks, &c.; and he pointed out the peculiarities of "river diggings," "flat diggings," and "dry diggings."

The search for gold in the beds of the existing rivers has, with few exceptions, proved to be unsuccessful in California.

Mr. Wilson described also in detail the porphyry of Table Mountain, the greenstone vein near Sullivan's Camp, the caves in the tertiary limestone at Coyote Creek, and the cinnabar mines in the clay-slate, with quartz veins, of the Coast Range.

* Read before the Geological Society, Somerset House, London.

ON THE COROMANDEL GOLD DIGGINGS, NEW ZEALAND.

BY MR. C. HEAPLEY, IN A LETTER TO HIS EXCEL. SIR G. GREY.*

[Communicated by Sir Roderick Murchison, F.G.S.]

These diggings are on the west side of the dividing range, and have been worked in clays at the foot of the granite range, and in the gravel of a stream-bed. The excavations have been generally shallow, and the yield has hitherto been but scanty. The clays, however, are locally upwards of 30 feet deep, containing rock-fragments in the lowest part, and have not yet been fully explored; they rest on granite and quartz rock. Gold has also been found on the eastern side of the dividing range. From Mr. Swainson's notice of the Coromandel gold district, it appears that the granite is flanked by vertical schists, and the range is skirted by conglomerates; that volcanic rocks abound in the district; and that the auriferous detritus contains quartz-blocks, and fragments of granite, slate, and trap-rock.

ON THE GEOLOGY OF VICTORIA.

BY EVAN HOPKINS, ESQ., C.E., F.G.S.*

Mr. Hopkins laid before the society, and explained, a geological section of this part of Australia, extending from the Glenelg River, on the west, to beyond Mount Kosciusko, in the Australian Alps, to the east. This section exhibited the rock-structure of these regions as forming great parallel bands of schistose and granitic rock, having a north and south strike, and a vertical position. Along the line of section, the valley of the Glenelg exhibits limestone beds, lying on the foot of Mount William, in the Grampians, which consists of granite, capped by sandstone formed of decomposed granite. Mount Cole, in the Pyrenees, next in order, consists of hornblendic schists. The valley of the Loddon and Forest Creek are on the edges of a band of argillaceous schists, interlaminated with auriferous quartz. These schists constitute the "great auriferous band," extending north and south, from south of Ballarat to north of Bendigo. The granite of Mount Alexander succeeds; then the argillaceous band of the Campaspe Valley and the M'Ivor—this is the "M'Ivor auriferous band." Granite, the "Goulbourn auriferous band," the granite of Violet Town, the "Ovens River auriferous band," succeed in order to the eastward; and then the great granitic bands of the Australian Alps, occasionally interlaminated with clay-slate, &c. The eastern flanks of the Alps are covered by thick, unconformable beds of sandstone, with thin seams of coal. The auriferous deposits were shown to be derived by decomposition from the edges of the quartz rock, &c, and to exist under various conditions of depth and material, according to the conformation of the surface and the structure of the rock. The richest diggings are carried along the north and south extension of the quartzose bands. The difference between gold-diggings in the debris *in situ*, and in the debris that has been transported by streams, and so rendered alluvial, was also noticed.

ON THE GEOLOGY OF THE GOLD FIELDS OF VICTORIA.

The press of Australia has been complaining for a long time that science has done nothing towards developing the mineral wealth of that country, and that all the discoveries have been, and are being, made by mere practical men. Books had been written on the geology of New South Wales, Victoria, and Van Diemen's Land, describing, apparently with great minuteness, all the rocks; yet there was the gold left unnoticed spread over the surface in large quantities, and would probably have been left there some time longer, had it not been for Mr. Hargreaves and three or four others, who had been digging in California, who, returning to Bathurst, found the rocks there similar to those in California—*i. e.*, bands of slates, and quartz on edges, running north and south. They did not waste their time in searching for fossils, or in endeavouring to trace the effects of volcanoes, but commenced digging in real earnest, and soon discovered sufficient quantity of the precious metal to cause excitement, and to lead to the subsequent discoveries which have astonished the world. Each colony of the Australian region has been supplied with Government geologists, yet the same complaint is still made, not alone by the press, but also by the Councils, and by those working in the gold-fields. What is the cause of all this? The general opinion is that young men are sent out, possessing no practical knowledge whatever, who have only been trained to distinguish fossils, and to study old favourite systems, knowing little or nothing of rocks and minerals as they are found in Nature.

The discussions on Mr. Selwyn's paper at the last meeting of the Geological Society exemplify the disparity between the observations of Government surveyors and those of our own practical men. Mr. Selwyn indicated in his section a basin of sedimentary beds on the western side of Mount Alexander, and although he confessed in his paper that he could neither find fossils, nor even trace the bedding, and could only see the north and south cleavage, yet the latter was left undescribed; whilst the former, which is not traceable, was duly delineated as distinctly as in our coal-fields!

Mr. Hopkins's observations at the meeting on the subject, although but few, were quite sufficient to show that the imagination was allowed to supersede the reality. Mr. Hopkins's sections exhibited the vertical structure of the primary rocks for hundreds of miles, and plainly showed that the vertical divisional planes were planes of the cleavage of the primary series, and not sedimentary planes, and in exact accordance with all the descriptions we have received from practical men. Indeed, the immense extent over which they can be traced, not alone in Australia, but also in California—*i. e.*, for hundreds of miles, running on edge north and south—is quite enough to show, irrespective of their crystalline character, that these bands are not sedimentary seams, and it is evident that our professors have not studied this subject.

We shall avail ourselves of Mr. Hopkins's pamphlet, and make occasional extracts, with the view of drawing more attention to this most interesting question. In the preface we find the following observations:—"This outline of the structure and composition of the primary rocks, and the general geological character of the colony of Victoria, has been prepared with the view of aiding those who are engaged in making discoveries, and removing many false impressions with reference to these interesting products of the mineral kingdom. Since the gold discovery innumerable pamphlets have been published in England for emigrants, with the avowed object of giving instructions to the gold seekers, and some of these have emanated from quarters whence the most valuable and authentic scientific and practical explanations ought to have been furnished; but they are found totally inapplicable, incorrect, and far from being instructive as guides to the gold-digger, or for any useful purposes, and, consequently, soon thrown aside in the colony, like the numberless patent gold-washing machines sent hither, to be looked at as mere curiosities," &c.

In entering into this subject, we beg to remind our readers that we are not quoting from papers sent here to be read, or to be discussed amongst a few members of a society. No; Mr. Hopkins's pamphlet was published in Melbourne—it is now in the hands of all the colonial Governments, the gold commissioners, and the diggers of Victoria; and thus it enables them to test the accuracy of his observations and sections in their respective districts. As we are in communication with many practical and good observing men in all these regions, we trust that we shall be able to give a few useful lessons to those who are engaged in seeking for gold, and also, we hope, to those who instruct young men for such pursuits.

[*To be continued.*]

* Read before the Geological Society, Somerset House, London.

ON THE METALLIFEROUS VEINS OR LODES OF DEVON AND CORNWALL, AND THE METHODS OF MINING THEM.

BY MR. GEORGE HENWOOD, M.E.

[*Concluded from the Mining Journal of March 4.*]

Indeed, there is scarcely a profitable mine in the two counties that has not passed through two or three companies hands before becoming dividend-paying. The extreme anxiety of promoters of mining speculations to get their mines into work too frequently lead them to under estimate the cost of machinery and necessary work to develope them, and are over sanguine as to the period for making profitable returns. Although the mine may be intrinsically good, yet a breach of either of these covenants sours the proprietary, and further call for a trifling outlay, which would accomplish all required, splits up the company, and the property is abandoned to some more fortunate speculators. A case of this sort struck me very forcibly on a recent occasion, by a visit to Wheal Jane, near Truro, which I consider one of the "Cornish miracles," having declared dividends of 4*l*. 10s. per share, without troubling the shareholders to advance one shilling to work it; the shares are at present worth 18*l*. to 20*l*. each. On coming on the ground, I was astonished to see this celebrated spot was well known to me as Wheal Falmouth, when working about 20 years ago. This mine was abandoned from the cause before mentioned. East Pool and Boscaswell Downs, which have both been rich mines, are also well-known instances of this popular and profitable kind, and it would give me sincere pleasure to introduce one of a similar nature to my auditory. It is also obvious that, to drain these vast excavations, extensive machinery must be erected; in situations where water-power can be made available a great saving is effected, but where this desideratum cannot be obtained steam must be resorted to. Many of these engines are of stupendous dimensions; some mines employ several of 70 or 80-in. cylinder for pumping, and at the Great Wheal Vor Tin Mine, near Helston, lately resumed, they are about to erect one of no less than 100 inches cylinder. These engines cost from 2000*l*. to 3000*l*. each. In addition to these, large and deep mines employ steam-power for raising the ores and refuse from the levels, and are called steam-whims. In many tin mines they stamp (that is, reduce the tin to a powder) by steam-engines. The high price of coal in Cornwall and Devon renders this item of mining very costly.

Wood and iron enter largely into mine expenses, as in the stopes the miners use wood to prevent the walls from falling together; in loose, friable ground, immense quantities of Norway timber is sawn into planks, and supported at short intervals by whole timber, about 9 in. square, to keep the roofs and sides from crumbling away and obstructing the passage. At the surface entrance to the shafts, care is required to put a wooden frame work of sufficient strength to prevent any accidents; this is called collaring the shaft. The capstan and shears, with their enormous rope that must reach the bottom, and not less than 9 or 12-inch rope is strong enough, are also expensive items; these are used for lowering the pumps and heavy work into the mine. Candles and gunpowder, to say nothing of oil, tallow, hemp, &c., swell the sum. Then there are whims, dressing floors, dressing machinery, and a long list of et ceteras, before one word is said about the mainspring, labour. Yet, despite all these charges, the mines have paid, do, and will pay, if managed scientifically and economically. It is an acknowledged fact that more mines are discontinued from want of management than want of mineral, and that in too many cases has the money subscribed to work the mine been spent on the surface, instead of under it, or in the terrible abyss of the law. Jealousy and petty squabblings are also fertile sources of failure. This is not mining, and should not be laid to the fault of mining, as is too frequently the case. It may, perhaps, not be uninteresting here to mention the sums realised as profits by a few mining companies:—

Great Wheal Vor, upwards of	£500,000	0	0
Great Crinnis	160,000	0	0
Pembroke	200,000	0	0
East Crinnis	200,000	0	0
Fowey Consols	350,000	0	0
Great St. George	68,000	0	0
Levant	103,800	0	0
Wheal Basset	122,880	0	0
Wheal Buller (second working)	87,787	0	0
Devon Great Consols	366,592	0	0
Great Consols, Cornwall	40,000	0	0
South Caradon	72,604	0	0
West Caradon	58,650	0	0
Alfred Consols	43,370	0	0
Great Wheal Alfred	200,000	0	0

It must be owned these are the prizes, but by no means all; it must also be admitted there are many blanks, but these need not be so numerous if adventurers would use common caution, and exercise that strict economy of management they would do in their own counting-houses or domestic concerns, and employ only scientific and trustworthy captains and managers.

The mines are mostly situated in the barren districts of the county, on the tops or sides of the hills, in the low swampy ravines, or on the edges of precipitous cliffs; in the latter situation they form interesting and picturesque subjects for the artist. Perhaps Botallack Mine, in St. Just, near the Land's End, is as grand and entertaining a spot as a stranger can visit; the urbanity of the captains and agents cannot be exceeded. The visitor at his entrance to the mine finds himself on the top of a precipitous cliff, more than 300 feet high, and far above the chimnies of the engine-houses. At the base of this tremendous rock rolls the everlasting billows of the Atlantic, while midway are the engine-houses and miners, forming, together with the rocks, a group at once noble and terrific. To obtain the full effect and grandeur of the scene, the visitor should descend to the lower part of the mine, near the sea shore, when the majesty of the place bursts upon him in awful sublimity. It is a scene not to be easily forgotton. This mine has been wrought under the sea for a distance of more than half-a-mile.

Some of the mines, particularly on the Dart and Goss Moors, where no wood is seen for miles, seem shut out from humanity, and led the surly Johnson, on his visit to the Cornish mines, to write the celebrated stanza:

> O! Cornwall, barren, wretched spot of ground,
> Where naught but rocks and stones are to be found;
> Thy barren hills won't find thy pigmy sons with bread,
> Or wood to make 'm coffins when they 're dead.

To which the Cornish bard, with equal truth and wit, replied:—

> O! Cornwall, happy, blessed spot of ground,
> Where richest ores of every kind abound;
> Thy very hills are brass, thy rocks are tin,
> Thy wealth is not exposed without, but hid within.

It may appear strange to many that in the midst of so much mineral the discovery of copper there is of comparatively modern date, tin having been the sole object of the explorers: this metal was, undoubtedly, wrought for long antecedent to the existence of copper being known. Some German miners from the Hartz are said to have been the discoverers of this invaluable deposit. It had been neglected and thrown away by the Cornish old men, a term applied to the tinners whose works are left without a history, and are to be found scattered over every part of the metalliferous districts. Hedges have been destroyed, and even roads taken up, that had been built and laid with stones containing copper ore.

It will be still more astonishing that in this century metallurgy was so neglected that abundance of silver ore had been raised and thrown away as worthless—that only within a few months the production of gold has attracted any considerable attention, its very existence having been doubted, and "Gold in England" held up to ridicule, or treated with contempt. The discoveries in California and Australia seem likely to make us more attentive to our home resources, where we have plenty of scope, without seeking such distant shores for investment of capital. From the improved methods of smelting lately introduced, and the increased demand for black jack, blende, and the ores of zinc, which 10 or 12 years ago were worth nothing, are now become valuable; and mundic, or iron pyrites, that was considered worthless, is found to contain metals that will repay working for it. The establishment by Government of a Museum of Economic Geology in London has tended greatly to forward this science, and given it an impulse that cannot fail to be attended with important results to this country. Already Cornwall is moving in the matter, and endeavouring to establish a branch in that county in connection with a School of Mines, where miners may receive a course of education that may teach them the true value of their practical experience and discoveries, and enable them to transmit such valuable acquistions to posterity.

As accumulated knowledege never breaks a man's back, though it gives him great weight in society, I hope the effort may be attended with success, though I own "Shadows, clouds, and darkness hang upon it;" and that the experience of the present and future captains may be superior to that of a late Cornish celebrity (Joe Odgers), who, when asked the result of his long experience as to the productiveness of lodes in certain situa-

tions, replied—"I've worked 40 years as barrow boy, tutwork man, and tributer; and my experience is this here—'Where there's ore, there's ore; and where there's none, there's none.'"

The Royal Polytechnic Society is also doing the mining interest essential service by the scientific researches and powerful patrontage of a Lemon, a Fox, a Carne, and a long list of Cornish worthies, whose names will descend with renown to posterity as the pioneers of science connected with mining.

The country is also under great obligations to its Royal Geological Society, who have published many invaluable papers in the records of their *Transactions*, and whose magnificent collection of minerals is at all times open to the view or reference of the student in any department of the science. When discoursing on mining matters, I have frequently been asked the meaning of the words "huel" or "wheal," prefixed to the names of mines—as Wheal Lovel, Wheal Mary, Wheal Edward, Wheal Basset, &c. There have been several origins ascribed for these words by different authors that would occupy too much time to enumerate. The most feasible appear to be two—one of which supposes it to refer to the old Cornish word huel, or hole: thus applying to a mine as a hole in the ground. The other says that wheal is a corruption of the word wheel, which was the only method at that time known of draining the water; and when the prefix was used, it implied that the mine was worked by this necessary adjunct. Whether of the two be correct I know not, nor do I think it matters a jot—the terms now being synonymous, and are held to be a mine. After all, huel may have meant a mine without a wheel, and wheal a mine with one.

A great deal has lately been said and written about the Cost-book System—a simple and plain method of book-keeping acknowledged in the Stannary Courts, by which most of these concerns profess, and ought to be conducted. By the rules of the Cost-book System it has been argued that a shareholder is only responsible for the proportion he holds, or subscribes, and no more; but this is a fallacy.

True, he may resign his interest at any time, by giving notice to the purser, or secretary, in writing of his intention to do so, and paying his share of costs up to that date. The only real security the Cost-book System affords is the compulsory calling the proprietors together at stated intervals, and laying before them every item of expenditure—the prompt payment of which keeps the mine out of debt, and, consequently, the adventurers free from liability. The books are also always open to the scrutiny of every shareholder. Too frequently these stated meetings are slightly attended; and as the majority present are binding on those absent, sums are voted that those at a distance are unwilling or unable to pay—thus the mine gets into difficulty, and ultimately stops. This has been the fate of many a noble mine; when falling into better hands it has been properly developed.

In conclusion, allow me to say a few words for the miners, whose exertions effect these mighty works. The miner's life is one of danger, toil, and hard labour. Few, very few, live to an old age, as a visit to one of the churchyards plainly indicate. Severe labour in a humid atmosphere tells its tale, even on the most robust constitution. Many fall premature victims from accidents and carelessness. They are subject to a complaint peculiar to them, called the miner's consumption, which takes off immense numbers at an early age. Of their little peculiarities and superstitions I spoke in my former lecture,* and, consequently, need not repeat them, especially as they are rapidly on the decline. On the whole, the miners of Devon and Cornwall as a body may be classed among the most patient, industrious, hardy, and contented labourers in the kingdom. Their remuneration is very moderate, but still superior to that of the agricultural labourers in their localities; whilst they are immeasurably their superiors in intelligence and behaviour. To any parties who visit the mines, I will say they are certain of receiving every attention and information, from the chief captains down to the very lowest boy employed—that every facility is afforded them of seeing and learning everything connected with the different departments—that they will see much to delight and instruct, and that they will then realise all that I have attempted to portray and simplify this evening. That I may have been successful in aiding them in this pleasing duty is my sincere wish and ample reward.

PRACTICABILITY OF A MINING EXCHANGE.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—The want of such an Exchange is universally felt by the public, and it must be admitted on all hands that its establishment would be a great boon in several respects. The amount of money laid out and sunk in British and Foreign mines, both dividend-paying and non-paying, must be enormous in the aggregate; but for the figures I advise those who wish to make themselves *au fait* as to the exact state of the case at present, to peruse two *brochures*, published at your office—viz., *Progress of Mining in* 1853, by J. Y. Watson, F.G.S., price 1s.; and *Statistics of the Mining Interests for* 1853, by W. H. Cuell, Esq., price 6d. There can be no doubt that the prices of some dividend-paying mines of 10 to 20 per cent. are unduly depressed; and that some progressive mines purchased this week, and held for a time, would produce to purchasers enormous profits. To what cause, or causes, are such a state of things to be attributed? Why to the almost total absence of facilities for buying and selling. In order to do business in a few shares, one is obliged to spend the best part of a day, and the prices vary in a most extraordinary manner—one broker asking 20 to 50 per cent. in price more than another. Sometimes when a sale is made, one has a few minutes' afterwards the non-gratification to hear that another person was a buyer at a much higher figure, and had been running about all day seeking in vain to procure them. This is very annoying to both parties, and would be obviated in a measure by a daily place of meeting; nevertheless, many other reforms are necessary—some of which I will point out. If I look at the front page of your Journal, I find numerous advertisements from brokers. Some state they transact business in all the mines quoted in the *Mining Journal*. There is something very ridiculous in this, as it is almost impossible that in this case justice can be done to the client. I should recommend each company, as far as practicable, to make choice of a broker; and then the general public, both for buying and selling, would come to him, by which a large stroke of business might be done in a few minutes. I would often charge myself with a large additional number of shares in a concern in which I had confidence, were it not that, in case of a pressure for money, I could not, very possibly, realise them without a sacrifice, mainly owing to the absence of adequate facilities. In the New Exchange, I should propose that the brokers keep near the pillars, and that each should represent a county or country, and be marked thus—Ireland, Devon, Cornwall, Wales, and Foreign Mines. When the Stock Exchange (from which I have borrowed these ideas of classification) give up the Hall of Commerce, I consider it admirably adapted in every respect for my proposed plan. In spite of all that has been written against it, I am decidedly in favour of the system adopted by Messrs. Watson, Pike, and the other agents, who mark the prices at which their principals authorise them to sell; but here, again, there appears to me to be a deficiency in the omission of the number of shares so offered for disposal. I consider it a waste of money and words to announce, as is done by some brokers, that they are sellers of shares in 146 mines! Some, more modest, only offer to sell shares in from 10 to 50 mines. It must be quite obvious that, in order to be well acquainted with the ins and outs of 150 mines, an establishment larger than Glyn's would be requisite. We sometimes see by chance that some of the brokers are buyers of mining shares, but these advertisements are few and far between; and then it is no use saying "I will buy," without naming a price. It causes no end of annoyance both to the public and to the broker. It reminds me of the folly of offering to let a house in a good situation without naming terms; and when one thinks it will suit him, and goes to the agent to enquire, finds it about 50 per cent. dearer than he intends to pay. I lately saw shares off red for sale in a mine in which I had some; it was stated no reasonable offer would be refused. On taking the trouble to go to the office, I was told the lowest price was ⅛ prem., although I had in vain searched for a buyer at par. I was since told that the individual in question had no shares at all on hand, and only advertised in the above manner to cause annoyance to the secretary, or, according to another account, to damage the concern, to enable him, or the tools who employed him, to buy largely on the fall. It must be remembered brokers are not their own masters; and, consequently, by having to work very often for designing knaves, cannot see the drift, aim, and end of what they are ordered to do; consequently, every allowance ought to be made for their actions. I think a scale of charges ought to be fixed, and one uniform rate adopted, for shares in value of not more than 5*l.* each —so much (like receipt stamps) for shares between 10*l.* and 20*l.*, above 100*l.*, and not exceeding 500*l.* Really, myself and the major proportion of the public are profoundly ignorant of the fair brokerage we ought to pay for purchasing or selling West Caradon, Devon Great Consols, North Pool, South Caradon, Wheal Basset, and United Mines. Last year, I purchased two Australian Agricultural at 280*l.* each, on which I paid only 1*l.* 5*s.* per share brokerage; whilst another broker charged a friend of mine 50*s.* a share. I suggest on shares under the value of 5*l.*, 1*s.* a share should be charged; from 5*l.* to 10*l.*, 1*s.* 6*d.*; from 10*l.* to 25*l.*, 2*s.*; from 25*l.* to 50*l.*, 2*s.* 6*d.*; from 50*l.* to 100*l.*, 5*s.*; from 100*l.* to 150*l.*, 12*s.* 6*d.*; from 150*l.* to 250*l.*, 1*l.* I am not wedded to these ideas; discussion may possibly induce me to alter my mind. It would also be a more satisfactory state of things if each broker would confine himself to a small number of shares in particular, and get his clerk to copy from the office, as soon as they are received there, the accounts from the said mines. By this simplicity of arrangement, supposing I had business to do in Alfred Consols, I would walk in at one door of the Hall of Commerce, to which the public would be admitted at 5*l.* 5*s.* a year, and immediately walk up to the Cornwall district, where I would ask the principal broker in these shares the current buying and selling price in (say) 10 shares. He would say I will buy them at 21⅛, and sell them at 22⅛, money to be paid on the account day, in order to give time for the transfer to be made. We will suppose I intended to invest in them, then I should buy them at 22*l.* 10*s.*, and pay cheerfully 2*s.* a share commission. What a contrast this bears to the hole and corner way at present adopted by the brokers. Several futile attempts have been made during the past year to establish such a desideratum, to which you have, with your usual foresight and tact, given a helping hand. Were the impediments and difficulties thrown in the way of such a formidable nature as to cause the failure to be anything more than temporary? I answer, no. They were of the most trivial kind, and mainly arose from petty jealousies existing amongst a small knot of men. Every one thought himself a "triton amongst the minnows," and wished to be the "cock of the walk" in the management. My sentiments on this subject widely differ. It appears to me that the Exchange should be managed by the public mainly. I would not, however, exclude brokers from being eligible to be on the committee, to be chosen annually from amongst the subscribers. I would make them pay 5*l.* 5*s.* annually. In answer to questions as to whether at the onset I would admit every one who came there and paid his subscription, I should say decidedly, yes. Let all the past be forgotten. If a notorious defaulter, or black sheep, has the foolhardiness to wish to strut about the interior of the building, be assured the evil will cure itself in a very short time, as the finger of scorn will soon make the place very uncomfortable for him. Exclusion once commenced cannot be checked. It would be impossible to draw a line of distinction.

Mr. Commissioner Goulburn was very severe last Saturday, whilst delivering judgment *in re* Tredinnick. He said:—"A broker is a character well known to the commercial community. They are among the most eminent men in trade. There is no class of persons more important in commerce, and whose avocations place them more in the front ranks of the mercantile community, than brokers. Brokers are that class of traders who stand between two parties—the one who sells, and the one who purchases. For such transactions they take a profit, and they are of the greatest use among men in trade, many being distinguished for their great opulence and respectability in following that pursuit. . . . . The bankrupt dealt in mining shares of every description, of every kind, and class, and character. The sort of names given to these mines was almost ludicrous and curious; they seemed to have been given for the purpose of attracting observation, more like what a conjuror would use than a man of business; in fact, a new mine was usually dignified by some extraordinary title, and, strange as it may seem, these titles do seem to have attracted many persons to purchase these bits of waste-paper. I do think that gentlemen like Mr. Tredinnick do infinite mischief, and are open to almost the same degree of censure as those persons who pass counterfeit coin; because they pass upon credulous people things under the name of shares, imagining they are going to make their fortunes; but instead of making a fortune, those speculations generally result most miserably, and not unfrequently end in bankruptcy and ruin." There is much truth in these observations.

I shall return to London for the season on March 15th, and shall then endeavour to ascertain what may be considered the best course to be pursued to complete the plan of which I have furnished a skeleton outline. It is said that most of the present agents speculate largely on their own account, which is highly objectionable, and not legal. It would be desirable that all engaged as brokers should take out a license in the City of London to act—in fact, should be sworn brokers. There is ample room for any quantity of new ones. An official list will appear daily of business actually transacted, and weekly with the buying and selling price of as many mines as can be ascertained. The Hall should be opened daily, like Lloyd's, from 9 till 5 o'clock, but the time for business should be as at Paris, from 1 to 3 o'clock, and no cognizance should be taken of bargains not transacted between these two hours. One of the rooms should be fitted up with all kinds of statistical information relative to mining, and also with the daily papers. I shall soon call a public meeting on the subject, which shall not be a formal one, but open to all kinds of questions and answers, with a view to answer objections, and to expose fully the extraordinary monopoly attempted to be kept up by a few, although I have no doubt, by warmly seconding my proposals, their business would be augmented tenfold. I have lately received two written notes from people with whom I have never exchanged a word, one recommending me to exchange Cuberts for Quintrell Downs, and the other to buy Cuberts. Who can decide when doctors disagree? As far as the present price may be taken as a criterion, the former advice would not have turned out well if I had followed it; but the fact is, I rarely follow, but mostly lead.

This article is intended as a feeler: it will, no doubt, elicit an expression of ideas from those interested. In an early Journal I will continue the subject, which I hope to see handled by your correspondents with their usual ability.

I have every reason to believe that there are as many bubbles amongst the English mines as the gold companies which I have lately exposed; in fact, some of the worthy directors of the last named, being now rendered by me "frozen-out gardeners," are starting a fresh game, by advertising new schemes, such as railways, slab quarries, and even making a further attempt to extract gold from us by means of Berdan's machine. Never say die. A word to the wise is sufficient; therefore I shall not hint further as to what is "best to eat, drink, and avoid." Mining is at the best a lottery: how necessary is it, then, that one should be acquainted with the characters of the directors, and not entrust one's capital into the hands of those with whose integrity and position one is unacquainted.

Paris, March 10. H. GUEDALLA.

MONSTER STEAM-SHIP.—The ways for laying down an immense screw and paddle steamer for the Eastern Steam Navigation Company are in the course of completion at the yard of Messrs. Scott Russell, the extensive shipbuilders at Millwall, where some hundreds of piles have been driven in order to support the huge fabric. Many hundreds of tons of iron for her keel are ready to be put together, and the contracts have been signed for the completion and launching of the ship within two years from the present time. The following are a few particulars of her dimensions:—Extreme length on main deck, 700 feet, being 430 feet longer than the great *Himalaya* steamer; extreme length of keel, 680 ft.; extreme breadth of beam, 83 ft.; depth of hold (forming four decks), 58 ft.; length of principal saloon, 80 ft.; height of ditto, 15 ft.; tonnage, 10,000, or builder's measurement, 22,000 tons: stowage for coals, 10,000 tons; stowage for cargo, 5000 tons; 500 first-class cabins, with ample space for second and third-class passengers, besides troops, &c., while her screw and paddle engines will be of the aggregate nominal power of 2800 horse. She will also carry an immense quantity of sail. The principle of her construction, as designed by Mr. Brunel, will be precisely similar to the tube of the Britannia-bridge. Her bottom, decks, and sides, are to be double, and of a cellular form, with 2 ft. 6 inches between. She will have no fewer than 14 water-tight compartments, also two divisional bulkheads running her whole length. The great length of the ship, it is contended, according to all present experience, will enable her to pass through the water at a greater velocity, with a similar power in proportion to her tonnage, than ordinary vessels now require to make 10 knots per hour, and that speed is, in fact, another result of great size, her immense proportions admitting her carrying sufficient fuel on board to accomplish a voyage round the world.

RAILWAY LOCOMOTIVES.—An experiment was made at the Salford engine-shed of the Lancashire and Yorkshire Railway, on Wednesday, to test the efficiency of an apparatus invented by Messrs. E. and J. Rowland, of Manchester, for cleansing the copper tubes of railway locomotive boilers. The apparatus consists of a valve attached to the steam-chamber of the locomotive at the top of the boiler in front, from which a flexible pipe or tube projects. The smoke-box door in front of engine being opened, the ends of the copper tubes of the boiler are exposed to view, and a conical jet at the loose end of the flexible pipe being applied to each tube in succession, a quantity of steam is injected. In the locomotive on which the experiment was tried there were 229 parallel horizontal 1½ inch copper tubes, perfectly cleansed of white ashes, incrustations, cinders, &c., with which all tubes in locomotives become more or less choked when in use. The operation was performed in the course of 10 minutes. The mode of cleansing hitherto in use has been a long iron ramrod of half an inch in diameter, wrapped with tow at one end; and the time of cleansing 220 tubes with this would be fully three-quarters of an hour. In addition to a saving of time by this method, it is expected there will be much less wear and tear of the copper tubes than by the ordinary process.

* See *Mining Journal*, December 18 and 25, 1852, and January 1, 1853.

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